

Claims

We claim:

- 5        1. A *Borellia burgdorferi* epitope polypeptide with an amino acid sequence selected from the group consisting of:  
VQEGVQQEGAQQP-(beta-A) (beta-, 4)C;                            EIAAKAIGKKIHQNNNG-(beta-A) (beta-A) C;  
ISTLIKQKLDGLKNE-(beta-A) (beta-A) C;                            PWAESPKKPE-(beta-A) (beta-A) C;  
DKKAINLDKAQQKLD-(beta-A) (beta-A) C;  
ITKGKSQKSLGD-(beta-A) (beta-A) C;                            and                            GMTFRAQEGAFLTG-(beta-A) (beta-A) C.
- 10      2. The composition of matter of claim 1, wherein said epitope polypeptide **comprises** VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.
3. The composition of matter of claim 2, wherein said epitope polypeptide **consists essentially of** VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.
- 15      4. The composition of matter of claim 1, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNNG-(beta-A) (beta-A) C.
5. The composition of matter of claim 4, wherein said epitope polypeptide **consists essentially of** EIAAKAIGKKIHQNNNG-(beta-A) (beta-A) C.
- 20      6. The composition of matter of claim 1, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A) C.
7. The composition of matter of claim 6, wherein said epitope polypeptide **consists essentially of** ISTLIKQKLDGLKNE-(beta-A) (beta-A) C.
- 25      8. The composition of matter of claim 1, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A) (beta-A) C.
9. The composition of matter of claim 8, wherein said epitope polypeptide **consists essentially of** PWAESPKKPE-(beta-A) (beta-A) C.
- 30      10. The composition of matter of claim 1, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A) C.
11. The composition of matter of claim 10, wherein said epitope polypeptide **consists essentially of** DKKAINLDKAQQKLD-(beta-A) (beta-A) C.
- 35      12. The composition of matter of claim 1, wherein said epitope

polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.

13. The composition of matter of claim 12, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.

5 14. The composition of matter of claim 1, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.

15. The composition of matter of claim 14, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.

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for*  
16. A vaccine for immunizing against or treating for Lyme disease, the vaccine comprising an epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQP-(beta-A) (beta-, 4)C ; EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C ; ISTLIKQKLDGLKNE-(beta-A) (beta-A)C ; PWAESPKKPE-(beta-A) (beta-A)C ; DKKAINLDKAQQKLD-(beta-A) (beta-A)C ; ITKGKSQKSLGD-(beta-A) (beta-A)C ; and GMTFRAQEGAFLTG-(beta-A) (beta-A)C.

17. The vaccine of claim 16, wherein said epitope polypeptide comprises VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.

18. The vaccine of claim 17, wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.

19. The vaccine of claim 16, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.

20. The vaccine of claim 19, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.

21. The vaccine of claim 16, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.

22. The vaccine of claim 21, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.

23. The vaccine of claim 16, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A) (beta-A)C.

24. The vaccine of claim 23, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A) (beta-A)C.

35 25. The vaccine of claim 16, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A)C.

26. The vaccine of claim 25, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
27. The vaccine of claim 16, wherein said epitope polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.
- 5 28. The vaccine of claim 27, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.
29. The vaccine of claim 28, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
30. The vaccine of claim 29, wherein said epitope polypeptide  
10 consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.

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31. The nucleic acid sequence coding for a *Borellia burgdorferi* epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQQEGAQQP-(beta-A) (beta-, 4)C; EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C; ISTLIKQKLDGLKNE-(beta-A) (beta-A)C; PWAESP KKPE-(beta-A) (beta-A)C; DKKAINLDKAQQKLD-(beta-A) (beta-A)C; ITKGKSQKSLGD-(beta-A) (beta-A)C; and GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
32. The composition of matter of claim 31, wherein said epitope polypeptide comprises VQEGVQQQEGAQQP-(beta-A) (beta-, 4)C.
- 20 33. The composition of matter of claim 32, wherein said epitope polypeptide consists essentially of VQEGVQQQEGAQQP-(beta-A) (beta-, 4)C.
34. The composition of matter of claim 31, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
- 25 35. The composition of matter of claim 34, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
- 30 36. The composition of matter of claim 31, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
37. The composition of matter of claim 36, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
- 35 38. The composition of matter of claim 31, wherein said epitope polypeptide comprises PWAESP KKPE-(beta-A) (beta-A)C.

39. The composition of matter of claim 38, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A) (beta-A)C.
40. The composition of matter of claim 31, wherein said 5 epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
41. The composition of matter of claim 40, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
42. The composition of matter of claim 31, wherein said 10 epitope polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.
43. The composition of matter of claim 42, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.
44. The composition of matter of claim 31, wherein said 15 epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
45. The composition of matter of claim 44, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.